STS-107 SPAT Report #1

Oliu-1, Armando

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Sent: Tuesday, January 21, 2003 9:12 AM
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Subject: STS-107 SPAT Report #1

Good Morning,

«STS-107 SPAT Report.doc»

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02/27/2003

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DAILY ACTIVITY REPORT

SRB/RSRM (SPAT)

POSTFLIGHT

ASSESSMENT

TEAM

STS-1O7
DAILY ACTIVITY REPORT
SRB/RSRM POSTFLIGHT ASSESSMENT TEA~{SPAT)

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SRB/RSRM POSTFLIGHT ASSESSMENT TEAM (SPAT)

Period covered: Launch, 1/16/2003 to 1/18/2003

GENERAL

The STS-107/BI116 RSRM-88 flight set was successfully launched January 16, 2003,
GMT 2003:016:15:38:59.994-t -10:39 AM EST. In the recovery area at splashdown, the wind was from the ENE at 9 knots with 3-4 foot seas.
The boosters were in the water at the following locations from ship:

.Bearing 6.9 NM @ 0100 or 290 43.2' N, 780 10.4 W
.Bearing 7.3 NM @ 0050 or 290 43.7' N, 780 11.1' W

The boosters were removed from the slip Friday at approximately 1919 hours (LH motor)
and 2110 hours (RH motor).
Preliminary assessment revealed no significant problems associated with either RSRM. All components appear to be in good condition with typical areas of missing foam in the cavity collapse regions of the stiffener rings on both motors.

DISASSEMBLY SCHEDULE

Listed below is the disassembly schedule for this week only:

S&A Shipment Wednesday, 1/22/03
Strut NSI Removal Wednesday, 1/22/03
Aft Exit Cone Removal Wednesday, 1/22/03
LSC Removal Wednesday, 1/22/03
Aft Skirt Removal Thursday, 1/23/03
Nozzle Removal Friday, 1/24/03
Nozzle Shipment Saturday, 1/25/03

NEW SQUAWKS

Four new Squawks have been generated during this reporting period.

SQuawk ~ Status

107 -001 (LH/RH SRB) Blue Discoloration on Rock & Tilt Exhaust Ducts QE 107-002 (LH/RH SRB) Incomplete BTA Application HDP Areas QE 107-003 (RH SRB) Insta-foam Porta Pull missing QE
107-004 (RH RSRM) PocketlWash Erosion on RH Throat and Forward Exit
Cone 1/22

Total Squawks written this flow: 4

SPAT BOARD

The first SPAT Board Meeting is scheduled for 1/20/2003 at 10:00 AM in Hangar AF conference room.

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SRB HARDWARE ASSESSMENT

SLIP OPERATIONS 1/17/2003
Left Hand (Freedom)
Freedom Star arrived at the slip at 1802 hours. Slip operations proceeded at 1818 hours. Lifting operations started at 1853 hours and the SRB was removed from the water at 1919 hours. The LH SRB was set down on the dolly at 1945 hours. No major anomalies exist.
Right Hand (Liberty)
Liberty Star arrived at the slip at 1945 hours. Slip operations proceeded at 2000 hours. Lifting operations started at 2104 hours and the SRB was removed from the water at 2110 hours. The RH SRB was set down on the dolly at 2144 hours. No major anomalies exist.
Frustum Slip Operations LH & RH:
No major anomalies visible on frustum. All BSM fired; all BSM cover doors present. LH Frustum was set down on dolly at 1840 hours, no anomalies occurred. RH Frustum was set down on dolly at 2051 hours, no anomalies occurred. Parachutes offloaded with no anomalies
Forward Skirt LH & RH:
LH forward skirt had no damage evident to the dome. The shipboard observer reported a 3- 4-foot wrinkle in the forward skirt between the forward skirt door and the systems tunnel (+ Z to -Y) and two 18-inch wrinkles on the other side of the systems tunnel (- Y to 240°). Due to this report the LH booster was towed back at the 240 degree attach point and extra care was taken to lessen the strain at the wrinkled area. The LH skirt was brought in to the slip first to allow for the assessment of the damage as early as possible and allow for the formation of a mini team to assess the damage. Once in the slip, it was noted that the area in question was the same location as the repair done after B1042L. Comparison of the condition with pre-transfer photos showed no additional damage to the forward skirt. The area was sooted and this had caused the wrinkles to be enhanced causing concern by the divers and the shipboard observer. Upon closer inspection of the area it was noted that no damage to the TPS was observed, and during the sating operation the stringers in the repaired area were inspected with no damage noted and only 3 ounces of water found in the normal/typical location. It was determined that a mini team was not required since the forward skirt was not damaged further and the condition was identical to the pre- transfer photos which showed the same wrinkled area. Access door is intact, three ground straps were intact and the ground strap closest to the RSS Antenna along the +Z axis was bent outboard (A photograph was taken of the broken ground strap.), and all sealant around door perimeter is intact although along the perimeter of ground straps some sealant was missing. Camera window is undamaged. Both RSS antennas are undamaged. The DAS was removed on 1/18/03 and the GSE door was reinstalled.
RH forward skirt had no damage evident to the dome or cylindrical structure. Access
door is intact, ground straps are intact, and all sealant around door perimeter is intact. Camera window is undamaged. Both RSS antennas are undamaged. This

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skirt had approximately 1 quart of water isolated between the ring segments associated with lower and mid portion of the door (normal/typical location). The DAS was removed and the GSE door was installed. No reportable conditions inside the forward skirt.

Systems Tunnel Covers LH & RH:

All the Systems Covers are present with no obvious damage.

ETA Ring LH & RH:

There is no visible damage to the ETA Ring Components.

Strut Halves LH & RH:

All Struts appear to have separated properly -there is no visible damage.

AFT SKIRT STRUCTURE LH & RH:

There is no visible structural damage to the Aft Skirt Structures. All HDPs appear clean. Both T -0 Umbilical Plates are intact.

TVC LH & RH:

There are no anomalies to report. TVC slip operations completed at 2300 hrs. No hydrazine or hydraulic leaks detected. LH Rock FIV cable connector backshell was sheared. RH Rock OBDL was pinched and torn. For safety technicians will cap off the line for possible residue. Engineering signed off RODS with no contingency operations required to allow normal processing of TVC.

Bluing was noted on the LH & RH Aft Skirt acreage along with LH Rock & Tilt exhaust ducts. At the time of working the RH TVC you could not tell coloring on the Exhaust ducts.

All actuator attachment brackets are intact.

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SRB HARDWARE ASSESSMENT

OPEN ASSESSMENT 1/20/2003

FRUSTUMS

External structural inspection of both Frustum assemblies is complete with no anomalies to report. On the left hand frustum, there is one missing tie and there are two broken tabs on the aft curtain. On the right hand frustum, there are three broken ties on the aft curtain.

TPS LH FRUSTUM

The Hypalon topcoat was nominal with normal blistering over BT A insulation closeouts. The MCC-1 insulation was nominal with no visible missing acreage insulation and no unbonds over the fasteners. The Hypalon topcoat was nominal over the BTA molded area surrounding the BSMs exposing the BTA in locations where the aeroheat shield doors impacted the Hypalon. There was no BT A material loss associated with the impact. The RTV-133 closeouts surrounding the BSM nozzles remained intact and in place for approximately 75-100% of the circumference of the nozzles.

TPS RH FRUSTUM

The Hypalon topcoat was nominal with normal blistering over BT A insulation closeouts. The MCC-1 insulation was nominal with no visible missing acreage insulation and no unbonds over the fasteners. The Hypalon topcoat was nominal over the BT A molded area surrounding the BSMs exposing the BT A in locations where the aeroheat shield doors impacted the Hypalon. There was no BT A material loss associated with the impact. The RTV-133 closeouts surrounding the BSM nozzles remained intact and in place for approximately 75-100% of the circumference of the nozzles.

FRUSTUM FORWARD BSMs

LH & RH: TPS impact damage was nominal with normal deformation to strong back. The Aeroheat Shields were locked and at the following angles: LH: UL: -5° UR 0°, LL:O°, LR 0°; RH: UL:O°, UR: 0°, LL:O°, LR: +50°. The RH LR AHS Cover was bent back from either water impact or. reefing lines. All 8SM cover seals were intact with the exception RH UL that was displaced in the AHS hinge area. This is a nominal condition. Additional routine inspection of BSMs and AHSs to occur.

FRUSTUM NOSE CAP RELEASE SYSTEM Separation Ring

LH & RH Frustum Half: Separation ring fracture surfaces exhibited typical fracture surfaces. The fracture surface was continuous with no rips, tears or cracks noted. All mounting hardware was intact. No retrieval damage noted.

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FORWARD SKIRT LH & RH:

No structural damage to either forward skirt was observed. All deck fittings on LH and RH forward skirts were intact. There were no anomalies on the ET ball fittings, RSS crossover assemblies, and thrust posts on either skirt. No damage was noted to either Forward Skirt Access Door or Access Door Seal. Both LH & RH SRM S&A, Igniter and OPT cable disconnects in the Fwd Skirt are complete with no anomalies

TPS LH FORWARD SKIRT

The Hypalon topcoat was nominal with normal blistering over BTA insulation closeouts. The MCC-1 insulation had numerous small impacts on the -Y Axis associated with nozzle separation. There was minor erosion of the SLA-220 on the +/- 2 RSS Antennae. The RTV-108 and phenolic blocks were nominal. The RSS crossover had missing cork (2" X 2") to the topcoated substrate with clean fracture surfaces and substrate. The thrust post had an area of missing cork (1" X 2") with clean fracture surfaces.

TPS RH FORWARD SKIRT

The Hypalon topcoat was nominal with normal blistering over BTA insulation

closeouts. The MCC-1 insulation was nominal with no missing acreage insulation and no unbonds over the fasteners. There was minor erosion of the SLA-220 on the +2 Axis RSS Antennas while the RTV-1 08 and phenolic was nominal.

SEPARATION RING

LH & RH Forward Skirt Half: The separation ring fracture surfaces were well defined with clean and continuous separation / fracture planes. Separation ring backup rings exhibited very mild deformation. Detonator blocks were secure and the CDFA's were intact. One retainer pin and clip was missing on the LH Forward Skirt. Review of the retrieval video showed this most likely occurred during retrieval and is not ascent related. All other retainer pins and retainer clips were intact.

Forward Skirt \ Forward Sep Bolt:

Ball assembly contains normal circumferential scratches on spherical surfaces. SYSTEM TUNNEL COVERS LH & RH:

No structural damage was sustained on any tunnel cover. All ground straps and vented screen cover screens were intact. .

TPS LH SYSTEM TUNNEL COVERS/STIFFENER RING

The Hypa10n topcoat was nominal with normal blistering over BTA insulation closeouts. The MCC-1 and cork insulation was nominal with no missing acreage insulation and no unbonds over the fasteners. The missing Insta-foam was nominal with clean substrates and located between the -Y and -2 axis, in line with the water

geyser.

TPS RH SYSTEM TUNNEL COVERS/STIFFENER RING

The Hypalon topcoat was nominal with normal blistering over BTA insulation

closeouts. The MCC-1 and cork insulation was nominal with no missing acreage insulation and no unbonds over the fasteners. The missing Insta-foam was nominal with clean substrate located along to the -Y axis, in line with the water geyser.

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ETA RINGS & STRUT COVERS LH & RH:

The LH & RH ET attach rings sustained no observable structural damage. The diagonal strut restraint cable was broken on both the LH and RH SRBs. The restraint islands and fasteners were tight and intact on both SRBs. All ET attach ring covers were not damaged. All EPDM structural covers were not damaged. All EPDM Cover attachment fasteners were intact. All struts had intact lockwire except for one broken lockwire on the lower strut on the RH SRB. There was no damage on the upper strut fairing on either SRB. The lEA center and end covers were not damaged on both SRBs.

TPS LH ET ATTACH RINGS AND STRUTS

The ET Attach Ring exhibited missing Insta-foam on the aft side adjacent to the lEA and at the -Y axis with light sooting noted. The strut EPDM covers and associated RTV-133 applications were nominal. There were no adhesive failures associated with the EPDM insulated strut covers.

TPS RH ET Attach Rings and Struts

The ET Attach Ring exhibited missing Insta-foam on the aft side adjacent to the lEA and along the -Y axis, in line with the water geyser, with

clean fracture surfaces. Two areas where the porta-pull plugs are located (+Y, -Y axis) exhibited darkening of the substrate. One of these areas (adjacent to -Y axis) also exhibited darkening of the foam where the plug was missing. The strut EPDM covers and associated RTV- 133 applications were nominal.

Upper Struts:

First flight of Pacific Scientific bolts. Separation bolts had nominal fracture planes. Strut housings were clean and undamaged.

Diagonal Struts:

First flight of Pacific Scientific bolts. Separation bolts had nominal fracture planes. Strut housings clean and undamaged.

Lower Struts:

First flight of Pacific Scientific bolts. Separation bolts had nominal fracture planes. Strut housings clean and undamaged.

AFT SKIRT LH & RH:

No major structural damage was observed on either aft skirt. All thermal curtain attach segments on both the aft skirt side and compliance ring side were intact. All lockwire was intact on the LH and RH compliance ring thermal curtain attach brackets. Neither T -0 umbilical connector plates were damaged. The grounding interfaces sustained no damage. There was no loose T -0 Umbilical Plug on either SRB.

TPS LH AFT SKIRT

The Hypalon topcoat was nominal with normal blistering over BT A insulation closeouts. The MCC-1 insulation was nominal with no missing acreage insulation and no unbonds over the fasteners. Missing Insta-foam was nominal with clean substrates. There were typical BT A/Cork insulation failures, all with clean fracture surfaces, at the HDP FOS brackets #5 (2.0" X 2.0"), #6 (6.0" x 2.0"), #7 (8.0" X 4.0")

and #8 (2.0" x 2.0"). There was a cohesive failure of cork along the length of the T-O umbilical connection with clean fracture surfaces. There was incomplete BTA applications (0.25" X 0.50" max) in the web at HOP #7 and #6. The phenolic kick ring covers, RTV-133 and the silicone seal were nominal with normal delamination. BSMs were nominal with BTA missing from the nozzles as expected. Zinc protective coatings were nominal.

TPS RH AFT SKIRT

The Hypalon topcoat was nominal with normal blistering over BTA insulation closeouts. The MCC-1 insulation was nominal with no missing acreage insulation and no unbonds over the fasteners. Missing Insta-foam was nominal with clean substrates. There were adhesive failures of BTA insulation to the substrate on HOP FOS brackets #2 (12.0" x 2.0"), #3 (10.0" X 2.0") and #4 (12.0" x 2.0"). There was a cohesive failure of cork along the aft trailing edge adjacent to HOP #2 (2.0" X 0.5") with clean fracture surfaces. There was a cohesive failure of cork along the T-O umbilical connection with clean fracture surfaces. There was an incomplete BT A application (0.25" X 0.50" max) in the web at HOP #4. The phenolic kick ring covers, RTV-133 and the silicone seal were nominal with normal delamination. BSMs were nominal with BTA missing from the nozzles as expected. Zinc protective coatings were nominal.

BSMs:

All LH & RH BSM Carbon Nozzle Inserts were displaced. Heat Shield fracture surfaces were clean and continuous. Performance appeared nominal. Additional routine inspections to occur.

BLAST CONTAINER SUMMARY

All blast containers performed nominally, all frangible nuts fractured into two separate halves, and all major debris components were retained. Debris weighing will not be required per the 1 OMNL-0035 criteria.

RH Overall Performance:

All frangible nuts showed evidence of skewed firing with little to no minor web blowout on the secondary side. All plungers were seated and latched. All attach links exhibited nominal cup/cone fractures. All NSOs fired and were retained. All booster cartridges fired. All major debris elements were identified and retained. There was no major damage to the guide housing assembly, upper half blast container or lower half blast container. Upper and lower half blast container exhibited nominal dents and dings due to frangible nut separation.

One lockwire on the cantilever bolts on "cold" hold down post (HOP) 4 was broken. Conversation with divers indicated the drogue parachute was entangled on the Aft Skirt in the area of HOP 4. Because of the parachute entanglement, the broken lockwire is attributed to a post separation event and is therefore an acceptable condition per 10MNL-0035 H.

Both lead shock absorbers separated from the guide housing assembly at HOP 2. Both shock absorbers had booster cartridge blast impressions indicating shock absorber separation occurred after frangible nut separation, which is an acceptable condition per 10MNL-0035 H.

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LH Overall Performance:
All frangible nuts showed evidence of a close-to simultaneous firing, equal minor web blowout on both primary and secondary sides. All plungers were seated and latched. All attach links exhibited nominal cup/cone fractures. All NSOs fired and were retained. All booster cartridges fired. All major debris elements were identified and retained. There was no major damage to the guide housing assembly, upper half blast container or lower half blast container. Upper and lower half blast container exhibited nominal dents and dings due to frangible nut separation.

TVC LH & RH:
All four TVC systems are in good condition, with only minor items noted (Missing 10 tags, missing paint & acceptable hose and tube conditions -all due to water impact). All tubes and hoses were intact, except the RH rock overboard drain line (see below). No hydrazine or hydraulic fluid leaks were noted. All four FSMs retained nominal residual pressures of:

LH Rock (280) psig Tilt (290) psig
RH Rock (290) psig Tilt (290) psig

LH Rock SMFIV cable/connector sheared with only slight wire leads remaining on the mated half. Similar condition noted in 2 other systems (RH Rock & Tilt).

LH ROCK & TILT SYSTEMS:
Rock System Blue discoloration on the exhaust ducts on the outboard end. Tilt System Blue discoloration on the exhaust ducts on the outboard end.

RH ROCK & TILT SYSTEMS:
Rock System APU overboard drain line removed and capped due to Slip Ops findings. Rock APU Fuel inlet hose clocked. Tilt System Nominal results.

RSRM HARDWARE ASSESSMENT
Open assessment was conducted this morning. The LH and RH S&A devices, OPTs, and igniter heaters were removed and evaluated. All electrical connectors (except nozzle severance) were also evaluated. The hardware was in good condition. Hydrolase operations on both motors are in work. There was no indication of pocket/wash erosion on the LH nozzle. Pocket erosion was observed on the RH throat ring aft end along with blending to wash erosion on the forward end of the FEC.

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SRB/RSRM POSTFLIGHT ASSESSMENT TEAM (SPAT)

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